

What is claimed is:

1. An integrated fluid control system for a motor vehicle having at least one drive axle having left and right axle shafts each provided with a wheel mounted thereon, said hydraulic

5 control system comprising:

a vehicle torque control system including at least one fluidly operated clutch provided to regulate a drive torque distribution between said wheels of said motor vehicle in order to improve traction and stability of said motor vehicle on a drive surface;

a vehicle body roll control system including at least one fluidly operated force device
10 operatively connecting sprung and unsprung masses of the motor vehicle and provided to tilt a vehicle body relative to a vehicle chassis so as to counteract a rollover-inducing force; and

a common source of a fluid pressure provided to operate both said vehicle body roll control system and said vehicle torque control system.

15 2. The integrated fluid control system as defined in claim 1, wherein said torque control system includes at least one variable control valve in fluid communication with said common source of the fluid pressure for selectively regulating a fluid pressure supplied to said at least one clutch from said common source of the fluid pressure for continuously varying a torque transfer ratio through said at least one clutch between the engaged and disengaged
20 conditions, and wherein said vehicle body roll control system includes at least one variable control valve in fluid communication with said common source of the fluid pressure for selectively regulating a fluid pressure supplied to said at least one force device from said

common source of the fluid pressure.

3. The integrated fluid control system as defined in claim 2, wherein said at least one variable control valve of said torque control system and said at least one variable control valve
5 of said vehicle body roll control system are selectively and variably controlled by an electronic controller in response to at least one vehicle parameter.

4. The integrated fluid control system as defined in claim 3, wherein said torque control system includes:

10 a differential assembly coupled to each of said left and right axle shafts outwardly extending from said differential assembly;

a fluidly operated selectively engageable lock-up clutch for limiting relative rotation between said left and right axle shafts; and

a lock-up clutch actuator for selectively operating said lock-up clutch between a
15 disengaged condition and an engaged condition in response to the fluid pressure from said common source of the fluid pressure.

5. The integrated control system as defined in claim 4, wherein said torque control system further includes a variable lock-up control valve in fluid communication with said
20 common source of the fluid pressure for selectively regulating a fluid pressure supplied to said lock-up clutch actuator from said common source of the fluid pressure for continuously varying a torque transfer ratio through said lock-up clutch between the engaged and

disengaged conditions.

6. The integrated control system as defined in claim 5, wherein said lock-up clutch is a friction clutch.

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7. The integrated control system as defined in claim 3, wherein said torque control system further includes a left axle disconnect clutch provided to selectively disconnect a torque transfer from a prime mover of the motor vehicle to the left wheel thereof, a right axle disconnect clutch provided to selectively disconnect a torque transfer from the prime mover of the motor vehicle to the right wheel thereof, and left and right clutch actuators each provided for selectively operating corresponding one of said left and right clutches between a disengaged condition and an engaged condition in response to the fluid pressure from said common source of the fluid pressure.

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8. The integrated control system as defined in claim 7, wherein said torque control system further includes variable left and right control valves each in fluid communication with said common source of the fluid pressure for selectively regulating a fluid pressure supplied to each of said left and right clutch actuators from said common source of the fluid pressure.

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9. The integrated control system as defined in claim 8, wherein said left and right clutches are friction clutches.

10. The integrated fluid control system as defined in claim 3, wherein said vehicle
body roll control system further includes a variable roll control valve in fluid communication
with said common source of the fluid pressure for selectively regulating a fluid pressure
supplied to said at least one fluidly operated force device from said common source of the
5 fluid pressure.

11. The integrated fluid control system as defined in claim 10, wherein said at least
one fluidly operated force device of said vehicle body roll control system is a fluid pressure
actuator.
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12. The integrated fluid control system as defined in claim 11, wherein said fluid
pressure actuator includes a pressure cylinder in fluid communication with said variable roll
control valve, a piston reciprocating within said pressure cylinder, and a piston rod connected
to said piston and extending through said pressure cylinder; a distal end of said pressure
15 cylinder is secured to one of the sprung mass and the unsprung mass of the motor vehicle and
a distal end of said piston rod is secured to the other one of the sprung mass and the unsprung
mass of the motor vehicle.

13. The integrated fluid control system as defined in claim 1, wherein said torque
20 control system and said vehicle body roll control system are selectively and variably
controlled by an electronic controller in response to at least one vehicle parameter or at least
one operating parameter of said integrated control system.

14. The integrated fluid control system as defined in claim 1, wherein said common source of the fluid pressure for said vehicle torque control system and said vehicle body roll control system is selectively and variably controlled by an electronic controller in response to at least one vehicle parameter or at least one operating parameter of said integrated control
5 system.

15. The integrated control system as defined in claim 1, wherein said common source of the fluid pressure includes a fluid pump.

10 16. The integrated control system as defined in claim 15, wherein said common source of the fluid pressure further includes a fluid pressure accumulator in fluid communication with said fluid pump.

17. The integrated control system as defined in claim 16, wherein said common source
15 of the fluid pressure further includes a fluid reservoir storing a supply of an appropriate fluid.

18. The integrated fluid control system as defined in claim 3, wherein said electronic controller is connected to a plurality of sensors each indicative to at least one vehicle parameter or at least one operating parameter of said integrated control system as a control
20 input.

19. The integrated fluid control system as defined in claim 18, wherein said at least one vehicle parameter is one of a speed difference between input and output of one of said clutches, a vehicle speed, a vehicle lateral acceleration, a yaw rate and a steering angle.

5 20. The integrated fluid control system as defined in claim 18, wherein said at least one operating parameter of said integrated control system one of a fluid pressure supplied to said torque and body roll control systems by said common source of the fluid pressure, a fluid pressure supplied to said at least one clutch of said vehicle torque control system and a fluid pressure supplied to said at least one fluidly operated force device of said vehicle body roll
10 control system.